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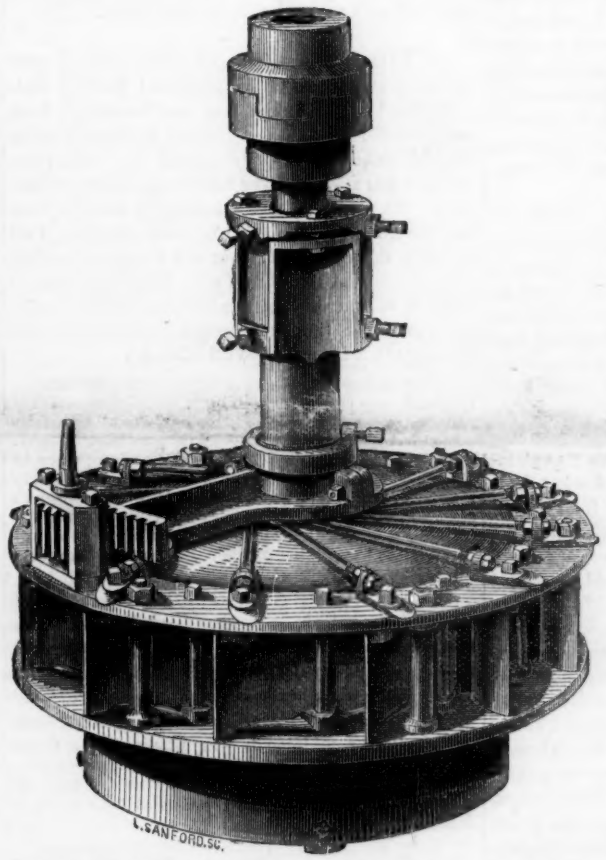
Leffel's Improved Double Turbine Water Wheel.

The accompanying cut is a representation of the James Leffel Improved Double Turbine Water Wheel, one of those meritorious American inventions that have attained world wide celebrity, as would appear, in this case, from the large number of them in use in driving all kinds of machinery, from the small country saw mill to the largest cotton mill in the United States.

It is one of that class of turbine wheels which receive the water from the outside, and discharge it centrally and downwardly; the application of the water being regulated by a number of gates on the exterior, by which the highest efficiency and most economical use of the water is obtained, combined with steadiness of motion. The peculiar construction of the wheel, and application of the water to it, meets the practical requirements of a first class water wheel, in using the water with economy, and giving a constant speed with the gates but partially opened; this being a feature long sought after in a turbine wheel, but never so fully realized as in this.

These wheels are adapted to the use of water under any practical head, as there are now some of them running under the extremes of from twenty inches to four hundred and twenty-five feet. They are made of sizes varying from 5¾ inches to 8 feet in diameter, the largest size named being the most powerful turbine wheel ever constructed.

More definite information can be obtained from the manufacturers, Messrs. James Leffel & Co., Springfield, Ohio, and 109 Liberty street, N. Y. City.



LEFFEL'S IMPROVED DOUBLE TURBINE WATER WHEEL.

Gas Affairs in Paris During 1871.

The report of the Paris Gas Company for 1871 furnishes us with some interesting details respecting the manufacture and distribution of gas under difficulties. At their previous meeting the directors had congratulated the shareholders on the comparatively small loss entailed upon them by the Prussian siege, little dreaming that a much more disastrous time was soon to follow. In April, 1871, the consumption of gas in Paris began to rise, and promised in a few months to regain its normal proportion. But the insurrection of the Commune followed immediately, and Paris had to sustain a second siege. During this the supply of gas was never interrupted, and it speaks volumes for the management of the company, that not one of the 3000 men in their employ joined in the insurrection. The directors pay a well-merited tribute to the devotion of their employees of all grades, but not a little praise should be awarded to a body of gentlemen whose liberality and considaration have inspired such devotion in a city where nearly every working man is a Socialist.

On the whole the damage done to the works and mains of the company in the course of the two sieges was not so great as might have been expected. Nine gasholders were piereed by shells, many guides were broken, and roofs and walls injured by projectiles, but the repairs of those only cost the company £2,763. The mains suffered to a greater extent, especially in the environs occupied by the Prussians, in which 248 miles of pipes required to be carefully examined and made good at an expense of £9,223. Pillars and lanterns, of which an immense number must have been destroyed, belong to the city, so the company takes no account of them. Along with houses, too, a good many meters were destroyed, and it has cost the company £832 to raplace these. Lastly, among the losses entailed by the second siege must be reckoned the stamp duties on transfers which the Commune forced the company to pay, and which M. Thiers's government had compelled them to pay aga'n, making no reply to the remonstrances which the company urged. The total expenses incurred on account of the two sieges is set down at £17,360.

The loss the company sustained is shown by the quantity of gas consumed and the rental. The gas consumed in 1871 amounted to 3,089,825,915 cubic feet, which is 950,223,591 feet less than was consumed in 1870, and 2,038,429,360 feet less than the consumption in 1869, which last is referred to as a "normal" year. The rental, of course, fell off in like proportion. Last year it amounted to £812,480, or £282,736 less than in 1870, and £612,441 below the rental of 1869.

Notwithstanding the troubles, the number of consumers actually increased, and the day consumption of gas fell off but little, much success having attended the efforts of the company to induce people to use gas for other purposes than lighting. The mains have been considerably extended during the year, the total length now laid being 941 miles. The works also have been enlarged, and the manufacturing power is now estimated at 10 per cent. in excess of the probable requirements of the present year. Along with the consumption of gas the dividends haev necessarily gone down. In 1869 the dividend paid on an original share (after dividing the profits above a certain amount with the city) was £4 1s. 8d. The dividend payable for 1871 on an original share (split into two in 1870) is only £2 12s. 6d., and there is no excess of profits for the city to participate in.

The revenue account shows that the total expenses of the company in 1871 amounted to £777,096. In this total the item "coal" figures for £276,825; and the heating materials, coke and tar, £63,977; superintendence and labor at works, £22,269; repairs and alterations at works, £40,102; charges accessory to distillation, £21,605; and cost of purification, £3,419. Among the other items we may mention, directors allowances, £3,200; and the executive committee, £2,800. The salaries (not comparable with the same item in the accounts of the London companies) amount to £21,060, and the law expenses to £431.

On the other side, the sale of gas produced £812,480; coke (retort), £260,946; tar, £23,219; branches and

fittings, £28,500. The Paris company is engaged in other manufactures not followed in English gas works, the receipts on which bring the income up to a total of £1,213.212. There thus appears a profit of £436,115 on the year's working. The municipality do not participate in the profits unless they exceed £496,000. The dividend paid is, as we have said, £2 12s. 6d. on an original share, which is equal to about 12 per cent.—*London Jour. Gas-Lighting.*

The Nassau Gas-Light Company's Works, of Brooklyn.

The buildings in course of construction for this company begin to assume such form and shape, as to give the passers-by an idea of what will be the magnitude of the work when completed. The warm weather retarded operations but slightly, and before the end of the month the framework for the iron roofs will no doubt be in position. The ground occupied is at the northwest corner of Kent avenue and Cross street, 300 feet on the former, and 464 on the latter, with a dock frontage of 220 feet. The gasometer is located at the corner of Keap street and Myrtle avenue, and its frame work is already up. It will have a capacity of 385,000 cubic feet, and adequate in all respects to receive and discharge the one million of cubic feet to be daily manufactured. The dimensions are, elevation 50 feet and diameter 104 feet. The retort and purifying house will be equal to the production of 2,000,000 cubic feet per day, should that quantity be required.

The company's district embraces the Ninth and Twonty-first wards, and a part of the Seventh, and assurance is given that consumers therein will have an illuminating agent not yet equalled by any works in this city. All the improvements in the mechanism required for gas making have been introduced, and means are to be adopted to prevent the condensation of the product, so that a stronger and purer light must of necessity be the result. The engineer in charge of the works is Capt. F. S. Benson, who was in the government service, and during the "unpleasantness," for the period of five years. He is a thoroughly practical gentleman, entirely free from the red tape reserve, may be approached without running a preliminary gauntlet of clerical impudence and indolence, and is a genuine worker without kid gloves and a sunshade.

There will shortly then be three gas companies in this district, the one in question ranking second in capacity. As each has its special territory to supply, there will be no such thing as competition, out of which consumers would no doubt be benefitted, either in the quality of the gas or the price of it. Whether there is a tacit understanding between the companies in the parcelling out of the city into districts for each other, cannot be positively ascertained; and if the fact could be shown, there is no way open to the public to prevent the distribution. At any rate, the improvements of the Nassau Company add materially to the business and enterprise of this section.—*Brooklyn Daily Times, July* 16.

Gas Items.

The stock of the Bloomfield Gas-Light Company, $50,000, has all been subscribed, and the works will be immediately put in operation.

The Metropolitan Gas-Light Company has donated $900 to the police who rendered assistance to the company during the strike.

At the late meeting of the Saugerties Gas-Light Company, the following officers were elected for the ensuing year: President, Wm. F. Russel; Secretary, Wm. R. Sheffield; Treasurer, B. M. Freleigh; Directors, Wm. F. Russel, J. Kiersted, G. Wilbur, J. L. Butzel, W. R. Sheffield, B. M. Freligh.

CHICAGO is going to make another tunnel under the lake, to double its water supply in case of fire.

Chemical Repertory.

No. 73.—August 2, 1872.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

388. To KEEP ICE.–Make a double pocket of strong woolen cloth, no matter how coarse and faded it is. Have a space about two inches or so between the inner and outer pockets, and pack this space as full as possible with feathers. You have no need to use geese feathers; hen feathers are just as good. With a pocket thus constructed and kept closely tied at the mouth, a few pounds of ice may be kept a week.—*Journal of the Farm.*

389. AGRICULTURAL.—An unauthentic story is that the sheep in Colorado have long wool, in which dust accumulates during summer. Then when grass has gone to seed the wind carries the seed into the meshes of the fleece. In winter the rain falls, the dust is turned to mud, in which grass grows, and then thousands of sheep may be seen travelling about in verdure clad, and with their pasture on their backs.

390. VALUE OF COAL-GEOLOGY.—[We recently quoted some statements of distinguished English coal-geologists bearing on the immense losses that have been suffered and follies committed, in Great Britain, through ignorance and contempt of the simple principles of this science. The following is a new and pat item. We may add that this country also has been very far from free from this plague of stupidity. Particularly, the amount of labor and expense that has been thrown away, and is *even now* being thrown away, in various parts of this country, in digging for coal (as under the Shawangunk mountains, for *one* example), has been beyond calculation.]

"Just before the sale of a large estate near Bristol, England, was completed lately, it was discovered that valuable veins of coal existed, which would naturally considerably affect the amount of purchase money. Something of the kind happened not long since in Wales, when veins of copper were found in the very "nick of time." The moral is, take a geologist's opinion before selling. It is rather trying to Brown, who has parted with his property for a hundred thousand dollars, to find that Smith is getting that sum from it annually by the discovery of coal."

391. A GOOD "GOAK."—Mr. George Francis Train, at the close of one of those wild performances which he calls lectures, announced to the audience that any one might now ask him questions, whereupon an old woman rose and asked, "What makes a pot leg burn in two in the middle?" The public jester stood dumbfounded. Occasion had been ministered to him, and yet he was silent. He had not wit enough to answer, because it can't burn in two at both ends.—*Daily Paper.*

392. VENTILATION OF SEWERS.—With the view of ventilating the sewers of Glasgow, and destroying the foul emanations from them, the police board have resolved to connect them with several large chimneys throughout the city, including those of Messrs. Townsend, and Tennant & Co., the two highest in the world.—*Scientific American.*

393. ADVANCING BACKWARDS.—Paris, it seems, is setting up a rivalry to New York in this line; as witness the following statement, which we get from the *Engineering and Mining Journal:*

"Paris is experimenting on wooden pavements, and to remove the difficulty experienced in repairing gas or water pipes, arising from the layer of crossed planks under the pavement blocks, the latter are placed on a layer of beton. Remembering that wood pavements have to be renewed every ten years, we should think that in a country where wood is so dear as in France, this would be of all substances the worst. Paris streets are already the envy of the world, except when it rains, and with the asphalt system so well carried out, it ought to rest content."

394. ALMOST INCREDIBLE, IF TRUE.—Several citizens of Sacramento, Cal., having been poisoned by the use of what is there known as the "sanitary composite" water pipe, the Board of Health have ordered its use to be discontinued. Water flowing through this pipe was found, on chemical analysis, to contain lead and arsenic. The pipe in question is believed to be composed of a species of brass.

395. GLYCERINE FOR LEATHER BELTING.—C. Mene.—After first observing that glycerine is a substance which has been found by experience to be useful as a means of increasing the elasticity and strength of leather, the author states that leather (hides rather), first partly tanned by the usual process, may be greatly improved—especially if required for machine-belts—by being soaked for some time in glycerine.

[In 1862, among other applications of glycerine, the editor of this Journal made this invention, and experimented thereon, and went so far as to file a caveat, as he believed it of much value; but he could find no one interested who would pay any attention to it. The belting becomes oil-proof, and to a certain extent fire-proof, with far greater flexibility and adhesion.]

396. CHEMISTRY OF WHISKEY.—[With the California miners, the material that passes among them for whiskey has sometimes been facetiously dubbed *nitro-glycerine*, from some analogies that they imagine between the effects of the two, we suppose. We wonder if the Brooklyn "whiskey-doctors," taking the hint, having been actually experimenting in this direction. The following item, from the newspapers a few weeks since, looks not unlike it.]

"About seven o'clock last evening a loud explosion was heard at the corner of Court street and Hamilton avenue, in the liquor store of John Daly. The shock drew a large crowd, for soon the place was in flames. The alarm was quickly given, and the firemen soon after arrived. The fire having been suppressed, investigation showed that a barrel of Bourbon whiskey had exploded, blowing out the whole front, and setting fire to the counter. Mr. Daly says he bought the whiskey from John Flynn, of Myrtle avenue, about five months ago, and had used a large portion of it. The head of the barrel was blown out and broken into pieces, while the balance of the barrel remained intact. What the cause of the explosion was no one can tell, and the origin of the fire is still a greater mystery.

397. LIGHT EMITTED BY THE VAPOR OF IODINE.—G. SALET.–When a crystal of iodine is put into a hard glass tube, the tube sealed, and then strongly heated to redness at some distance from the iodine, the latter substance will be seen, after the heating of the tube has been discontinued, to become volatilised, and to exhibit when entering the still hot portion of the tube a brilliant red light. This experiment may also be made by means of a glass tube provided with a spirally wound platinum wire, which is made red-hot by means of an electric current.

[In the last number of the *American Journal of Science*, the singular view appears to be put forth that this phenomenon is an actual *incandesence* of the iodine gas, though the temperature is manifestly lower than that which is deemed necessary for true incandescence. Is it not more reasonable to class it, provisionally, with the class of phenomena known as *phosphorescent?* Or rather is it not necessary to confine the term incandesecence to the luminosity of bodies which are really red-hot, or begin to emit light at the definite point of temperature known as a *red heat?*]

398. "HERE'S RICHNESS."—A writer who contributes very largely what he represents to be *geology*, to the *London Mining Journal*, winds up one of his recent assininities with the following impressive postscript:

N. B.—I may remark that nearly every layer in the earth but chalk bears iron—it is the current of the earth's rocks.—N. E.

399. MORE, OF THE LIKE.—In a long article in one of our most prominent dailies, appears the following chemical information about sea-water:

CHEMICAL ANALYSIS.—The constituent principles of sea-water change according to the place it is dipped up at, whether at the surface or at a given depth.

Chloride of sodium is the predominating principle; it is found in variable quantities. Besides this salt, sea water contains potassium, ammoniacum, (Marcet,) iodine, (Kruger,) and bromide, (Balard).

400. Poisonous Stamps.—The following joke is really no joke, though it comes from one of the funny papers.

A simple and effective mode of killing one's creditors without fear of detection has been invented in New Hampshire. It consists in writing to the intended victim a letter requiring an immediate answer, and enclosing a powerfully poisoned stamp for return postage. Agents who will take the patent rights for states or counties where there are many mothers-in-law may realize handsome profits.

[A recent observation of the Editor of this Journal is to the effect that the greater part of the legal stamps, used as seals, on an immense number of documents, (generally cut with scalloped edges) are colored, oftener than with any other material, with the terribly poisonous *arsenical-green* paint. Of late years these are never used *with wafers*, as of old, but are gummed, for convenience, on the reverse. The saliva readily detaches the poison, as we find. Has this fact anything to do with mysterious illnesses and deaths, among lawyers, copyists and others?]

401. Use for a Waste Product.—The saturated bran used by tin makers, which usually contains from 30 to 25 per cent. of palm oil, is now utilized by the new applibation of a process hitherto successfully applied in extracting oil from seeds. It is immersed in benzine (petroleum-naphtha?) for the oil to be brought into solution. The liquid solution is then placed in a still, and the benzine distilled off. The oil derived from the bran remaining in the still will then be ready for future use.—*Amer. Artisan.*

402. James River Coal.—The first coal ever mined in the United States was dug up near Richmond, Virginia. Bituminous coal was mined there as early as 1700, and in 1775 was extensively used in the vicinity. During the revolution a Richmond foundry employed this coal in making shot and shell for the use of the Continental forces.—*Exchange.*

403. Expansion of Moist Gases.—M. Amagat.—The following conclusions can be drawn from the author's researches: Unless gases are thoroughly well dried, the expansion of the same is increased far less by the presence of aqueous vapor than than has been supposed by some *savants*, who have attributed to the presence of aqueous vapor the differences which exist between the coefficients of dilatation of the different gases; that it is absolutely impossible to base a method of hygrometry (estimation of the degree of moisture in air) upon the variation of the coefficient of expansion of the air as due to moisture, since that variation is difficultly appreciable even for very great divergences of the quantity of moisture present in the air.—*French Acad.*

404. Carbon in Meteoric Iron.—J. Boussingault.—The author's researches have been made with a view to ascertain whether meteoric iron contains carbon in the same condition of combination as is the case with steel and manufactured iron. For this purpose the analysis (by means of bichloride of mercury) has been made of the meteoric iron of Caille (Alpes-Maritimes, France) and of Lenarto (Hungary). The former was found to contain 0·12 per cent. of combined carbon, but the latter neither contains graphite nor combined carbon.—*Ibid.*

405. Dissociation of Carbonic Acid by Electric Current.—A. Thenard.—The author states that when a slow current of carbonic acid is passed in Houzeau's apparatus for the preparation of ozone, that that gas is decomposed into oxide of carbon and oxygen, which latter is moreover strongly ozonised.—*Ibid.*

406. Solubilities and Specific Heats.—D. Tommasi.—The author states that for salts having the same chemical formulæ (sulphates, bromides), the coefficients of solubility in water are in direct relation to their specific heats. This is illustrated by a series of examples exhibited in tabulated forms. As regards the elementary gases (chlorine, oxygen, etc.), their solubility in water is in the inverse ratio of their specific heat.—*Les Mondes.*

British Association of Gas Managers.

The Ninth Annual General Meeting of the members of this Association was held on Tuesday, Wednesday, and Thursday, the 11th, 12th, and 13th of June, in the rooms of the Society of Arts, John street, Adelphi, London.

Tuesday, June 11.

The President, Jabez Church, Esq., M.I.C.E., took the chair.

Inaugural Address of the President.

[Condensed by the Editor of this Journal.]

It is a source of great satisfaction to me to be able to state that the British Association of Gas Managers has proved to be a thoroughly successful undertaking. I am happy to inform you that its present position is almost all that could be desired, and cannot but be highly gratifying to those gentlemen who, but nine years since, united with a view of establishing it. Although we have only been established so short a time, our members number very nearly 400, and we have to our credit a cash balance of more than £800. The progress of our society has proved as useful as it has been rapid, and we may now consider it as a permanent institution. Looking to the future, I see every reason to hope for a continuance, and even an increase, of its prosperity. By the addition of every new member, the sphere of its usefulness becomes widened and its practical value increased, and as we are constantly receiving accessions to our members, so are we the more firmly consolidating our position, and commanding recognition, not only throughout the kingdom, but in every part of the world where the subject of gas-lighting is entertained.

It is my painful duty to inform you that since we last met several of our friends and fellow-workers have passed away. Amongst them are three leading men in the profession, whose names can only be mentioned with a regret equal to the respect in which their memories are held. In August last we lost Mr. John Kirkham (father to our vice-president, Mr. T. N. Kirkham, and late engineer to the Imperial Gas Company), who might fairly be classed as one of the pioneers of gas-lighting. He was a man of considerable engineering ability, and has left some noble monuments of constructive skill at the works over which for many years he was the chief. He was not only esteemed for his professional knowledge but for kindliness of heart and gentlemanly bearing to all with whom he was associated. He died at the age of 79, and was deservedly esteemed and respected by every member of the profession who had the good fortune to know him.

The next deceased friend of whom I have to speak was perhaps better known to you. This was Mr. Thomas Livesey, late secretary to the South Metropolitan Gas Company, and father to our esteemed vice-president, Mr. G. T. Livesey. He was elected president of this association in June, 1870. It will be within your recollection that through the delicate state of his health, he was incapacitated from taking even a short sea voyage, and we, therefore, had to forego the valuable services that he would have rendered us, had he been enabled to preside at our Dublin conference. He was a man of an eminently practical nature, of great perseverance, and of the most rigid integrity; in fact, he may be classed with the George Stephenson type of men. He was the architect of his own fortune, and in every particular a most successful man. He died very suddenly in October last, being in his 65th year. At the age of 15 he entered the service of the Chartered Gas Company as a clerk, remaining there for 18 years, after which, in the year 1839, he was appointed chief clerk to the South Metropolitan Company, eventually becoming secretary on the incorporation of the company in the year 1842. At that time the capital of the company was £88,000, and the gasholder capacity was 144,000 cubic feet, and the price charged for gas 10s. per 1000. The company was then in an almost ruinous condition, but by his steady perseverance, quick and clear perceptive power, and businesslike habits, Mr. Livesey raised the undertaking to a state of the highest prosperity. At the time of his death the capital was £300,000, with a reserve fund amounting to £46,000, the gasholder storeage was 2,400,000 cubic feet, and the selling price of gas was 3s. 2d. per 1000 feet. This complete metamorphosis was made during the 32 years that our departed friend was in the service of the South Metropolitan Company, which is without doubt at the present moment the most prosperous gas company in the United Kingdom. In his private life he was most kind, and nothing that could be said in his favor would be beyond what his sterling character and honesty of purpose justly merit.

In February last we lost Mr. John Grafton, who formerly held a high position in gas engineering, but of late years has lived apart from professional pursuits. In 1814 he was one of Mr. Samuel Clegg's pupils, and he continued with him for some time. To him we are indebted for the introduction of brick ovens and clay retorts, as well as for the introduction of the exhauster. Mr. Grafton erected a large number of works in this country, and at one time was the sole proprietor of the Cambridge Gas Works. He was also concerned as director and shareholder in a number of other companies.

The metropolitan gas referees, appointed by the Board of Trade, have during the past year issued three reports—the first on the ammonia impurity in gas, the second on the construction of gas burners with regard to the principles of gas illumination, and the third on sulphur purification at the Beckton Gas Works. In the report on burners a great deal of useful information is given, but no new facts are set forth therein that can claim our attention. All the experiments made and their results, in using good and bad burners, have been long known to the members of our profession who are conversant with the subject of gas burners, and the necessity of having a properly adjusted supply of atmospheric air. The referees, however, having promised a further report on the subject, we may hope to receive not only some practical suggestions on the defective constructions of the burners now in use, but also remedies which will overcome their admitted defects.

The report on ammonia impurities contains some practical facts and suggestions, and will prove valuable to the profession. When the referees were first appointed they fixed five grains of ammonia per 100 100 feet of gas as a maximum, and from the experiments they have made, and also from the actual working of some of the metropolitan companies, they find it practical to manufacture gas quite free from ammonia. They consequently gave notice to the companies that on and after the 1st of November of last year, the maximum quantity of ammonia allowed in the gas was to be reduced from 5 grains to 2½ grains, and they now further hint that the standard will be reduced to *nil* ere long. They state that the process of purifying gas from ammonia consists mainly in bringing the gas into contact with water, which has a remarkable affinity for it, and is capable of absorbing above 700 times its own volume, and the most perfect process of ammonia purification is that which does its work with the least amount of water. The reasons given are—first, because when much water is used it absorbs a portion of the hydrocarbons; second, because the ammonia so formed is too weak to be saleable; and, third, that in consequence of this, the liquor has to be returned and passed through the scrubber several times to bring it up to the required strength, whereby the impurities with which the water is charged are again brought in contact and absorbed by the gas. The referees after setting forth the absolute necessity of proper and efficient condensing power, make special mention of the scrubbers employed at Blackfriars, as being the nearest to perfection in their operation. In table 3 of their report they show the amount of ammoniacal liquor obtained per ton of coal in the different gas works, and as at the Blackfriars works the whole of the ammonia is taken out of the gas, and also is eliminated almost entirely by the scrubbers in the form of ammoniacal liquor, the actual amount of ammonia may be calculated. At these works, 20 gallons of ammoniacal liquor of 10 oz. strength are obtained from each ton of coal, showing that the gas from each ton of coal contains about 1-10th of 1 per cent. of ammonia gas (NH_3). In other words, there is one foot of $N H_3$ in every 1000 feet of gas.

A considerable proportion of the ammonia is eliminated from the gas in the condensing pipes before reaching the scrubbers, and the more efficient the condensing process the more easily is the work of ammonia purification carried on in the scrubbers. At the Blackfriars works the condensers yield per ton of coal about nine gallons of six oz. liquor, and the scrubbers yield eleven gallons of 14 oz strength, so

that in this case one-third of the ammonia is taken out by the condensers and two-thirds by the scrubbers. But the ammoniacal liquor oblained from the condensers is too weak to be saleable, hence it has to be mixed with the stronger liquor obtained from the scrubbers. The requisite commercial strength of the liquor is about 10 oz.; if the liquor is much below that strength it is objectionable from its bulk, whilst if it is much above that strength it is objectionable as a saleable commodity, owing to its tendency to lose a portion of its ammonia by volatilization.

The "liquor" obtained from the condensers varies in strength from about 4½ to 7 oz.—these variations being mainly due to the condition of the coal as delivered to the retorts; for the drier the coal the less aqueous vapor is contained in the gas. Accordingly, the ammoniacal liquor formed in the condensers is less diluted than when the coal is more or less damp.

The ammonia which remains in the gas after passing through the scrubbers at the Blackfriars works only amounts to two or three grains per 1000 feet of gas. This residue is entirely absorbed by the moisture contained in the oxide of iron purifiers employed for the elimination of sulphur. At the same time it is to be observed that, in proportion as the amount of ammonia in the gas is reduced, the difficulty of catching it in the scrubbers becomes immensely increased. For example, in the excellent scrubbers employed at the Blackfriars works, where the coke is divided into three tiers or compartments, each eight feet deep, it is found that the lowest tier, which the gas first enters, yields of itself 11½ oz. liquor, the middle tier 2 oz. liquor, and the uppermost sier only ½ oz. liquor. In other words, of the total amount of ammonia eliminated by this scrubber (which yields 14 oz. liquor), the uppermost tier takes out only 3½ per cent,, while the lowermost takes out 82 per cent. Arguing from such facts, it is a common opinion in gas works that the more the water is impregnated with ammonia the more capable is it of absorbing ammonia—a notion, it is hardly necessary to say, wholly erroneous. The explanation of the fact, which has given rise to this idea, is evidently the very simple one, that the difficulty of catching ammonia (or any other substance) is immensely increased when the ammonia is greatly diluted, or, in other words, exists only in an infinitesimal quantity, compared with the volume of gas in which it is contained; whereas, when the liquor comes in contact with the unpurified gas, as it does in the lower part of the scrubber, the proportion of ammonia absorbed is very large.

A report on the sulphur purification at the Beckton Gas Works, dated January 31, 1872, has been issued, the publication of which was looked forward to with much interest, especially as the Gas Committee of the Corporation of the City of London has loudly complained of the large increase in the amount of sulphur in the gas supplied to the city since its manufacture commenced at the Beckton works.

[A brief summary of this report is then given by Mr. Church, which, as we have already given the whole report, in substance, we need not reproduce.]

In reviewing the various inventions introduced during the last year bearing directly on gas-lighting, I will direct your attention, in the first place, to perhaps the most important—viz., Dr. Eveleigh's patented improvements in the manufacture of gas. The invention relates to the manufacture and purification of gas generated from common coal and other similar substances.

The special improvements consist in distilling from these substances, in a retort at a comparatively low temperature of about 600° to 1,000° Fah., the best and richest portions of the gas contained in such substances, together with the oleaginous, tarry, and other vaporizable matters, the residue which remains in the retort being coke of a superior quality. The rich gases, together with the vaporizable matters, are conducted from the retort by pipes in a manner somewhat similar to that followed in ordinary practice; instead, however, of the usual hydraulic main, Dr. Eveleigh uses a large evolving tank, in which the chief portions of the oily and other vaporizable matters which come over with the gas are condensed as quickly as possible. The rich gas passes on into a peculiar cooler and condenser of the following character:

A large covered tank, about half filled with water, receives the gas from the pipe leading from the first-named cooling-tank. The gas coming in contact with the extended surface of water, is still further freed from depositable snbstances, and when thus freed becomes lighter, rises to the top of the tank, and passes off at the opposite end by a pipe, the mouth of which rises nearly to the top of tank. This gas is then further cooled, if necessary, by being passed through pipes immersed in water. From thence it is led to the purifiers. The larger proportion of the oleaginous and other vapors which are condensed in the first cooling-tank, and the remainder which is deposited in the second cooling-tank and condenser, are then collected and conveyed into another tank, from which they are allowed to flow gradually into a heated pan, where they are re-vaporized, and from whence the vapors so reproduced are passed through redistillation retorts charged with chemical purifiers. In the redistillation retorts the vapors are converted into gas, which is purified therein.

From the redistillation retorts the gas is passed through a cooling-tank similar to that already mentioned, and which contains water, wherein any of the vapors which have not been converted into gas by their passage through the redistillation retorts are condensed, and may be returned to the revaporizing pan and redistillation retorts for further treatment. This process is repeated over and over again until the the whole is decomposed, or until only *pitch* remains. From the cooling-tank this gas passes on to the condenser before referred to, mixing on its way with the rich gases coming over direct from the first distilling retort, and passing on with them to the purifiers, and thence to the gasholder for use.

By this process the patentee states that he is enabled to employ a low temperature in order to obtain the best and richest portions of the gas from the coal, and by his treatment of the oily, tarry, and other gas producing vapors, he states that he fully utilizes them, and obtains the remainder of the gas which they contain. In most cases, by these means, he finds that not only he produces a larger total quantity of gas from a given quantity of coal, but the illuminating power and purity of the gas so produced are much greater than can be obtained by the ordinary process, in which a great heat is employed. The value of the residual products, such as the coke and pitch, is also said to be greatly increased.

In order to give effect to the practical working of this process, the Patent Gas Company have erected distillatory apparatus at the New Barnet Gas Company's works, and have been manufacturing all the gas required by that company for the supply of their district for some months past. They have proved conclusively that they can manufacture gas from common coal of 20-candle-power; but upon the cost of manufacture and other important commercial points we are not yet informed,

Another invention, called the "Oxhydric Light," has created some sensation, and has been publicly exhibited at the Crystal Palace during the past season. The principle is by no means new, and consists in the introduction of oxygen gas at the point of combustion with common gas. Originally, when the system of using oxygen and coal gas together was introduced, it was known as the lime light, being much admired for its brilliancy and purity. Its combustion was, however, uncertain, and the cost of manufacturing oxygen was too expensive, and it therefore fell into disuse.

The oxygen used by the proprietors of the oxhydric light is produced by the method patented by Mr. Tessie du Motay, the invention being based upon the following data:

Manganates and permanganates of potassa, soda, and baryta; ferrates of potassa, soda, and baryta; chromates of potassa, soda, and baryta, and in general all metallic oxides or acids which will form with potassa, soda, and baryta, binary combinations capable of superoxidizing, and possess the property of yielding their oxygen at certain temperatures when they are submitted to the action of a current of steam. These bodies thus deoxidized also possess the property of becoming reoxidized when they are exposed to the action of a current of air. The invention, therefore, consists in the direct production of oxygen by means of atmospheric gas, and is based upon the double property just stated. In a retort one of the binary compounds is placed either at the minimum or at the maximum state of oxidation. If the binary compound is at the minimum state of oxidation, it is superoxidised by means of a current of air. If the compound is at the maximum state of oxidation, it is deoxidized by means of a current of steam. The oxygen and the steam on issuing from the retort pass together into a condenser, the steam is condensed, and the oxygen passes on to a gasholder in which it is collected. When all the utilizable oxygen contained in the binary compound has been disengaged by the action of the steam, the operation of superoxidation by means of air is recommenced, and *vice versa*. The production of oxygen is continued in this alternate manner as long as is necessary.

The manufacture of oxygen by this process, possesses great scientific merit, the old method being entirely superseded, and the cost of manufacture greatly reduced. Upon this improvement the proprietors consider it can compete commercially with ordinary gas; they also claim other important advantages in its combustion and purity. By way of comparison, the value of the new and the ordinary system is given as follows:

Oxyhydric.	*s.*	*d.*
2000 cubic feet coal gas at 3s. 9d. per 1000.....	7	6
Carburetting the same at 8d.....	1	4
1140 cubic feet of oxygen at 8s.....	8	1½
	17	11½

This, it is stated, will give an amount of light equal to 10,000 cubic feet of coal gas, costing, at 3s. 9d. per 1,000, £1 17s. 6d.

The comparative cost, therefore, as stated by the inventor, to produce an equal amount of light will be in each case—

By coal gas at present supplied.....	£1	17	6
By oxyhydric light.....	0	17	11½

Thus showing a saving in favor of the new supply of over 50 per cent.

The introduction of this system would involve duplicate mains, meters, internal pipes and fittings, together with apparatus for carburetting the coal gas, all of which would entail an additional expenditure. Judging, therefore, from these circumstances, it is not likely to supersede the existing system for general purposes, although it may be used for street lighting, and also in special cases with advantage.

It was exhibited in the Paris Exhibition, 1867, after which one of the Boulevards was lighted with it, but from some cause it was discontinued, and nothing more was heard of the invention until it was tried at the Crystal Palace last November.

The subject of charging and drawing retorts by machinery has been frequently brought before you, and has resulted in some very interesting and instructive discussions. I am happy to find that Mr. Somerville, who has certainly had great practical experience in the matter, has patented some very important improvements in this class of machinery. One of the chief objections to the introduction of drawing and charging by steam power has been its inapplicability, as previously designed, to existing settings. This difficulty, I am informed, has been overcome by Mr. Somerville, the machine being so arranged as to admit of such an adjustment as to make it suitable for any form of setting. Besides this, it is said to possess the additional advantages of simplicity, and freedom from excessive wear and tear, and is so contrived as to offer great facility for repair or renewal of any of the working parts. The merits of this invention, however, you will be better able to understand upon inspecting the model which is placed upon the table before you.

Mr. Somerville has also invented a retort lid which, while it is suited for any form of mouthpiece, admits of being luted by a machine which he has constructed for that purpose, and which may be attached to the same platform as the drawing and charging machine, and driven by the same engine.

Another matter of interest, and one which is now attracting some attention, is the invention of Messrs. Porter and Lane, by which it is proposed to supersede manual labor in charging the retorts. This is effected—to use the inventors own words—"by causing the continuous passage of a thin layer of coal through a vertical retort in close contact with the whole of the inner surface thereof, leaving the interior space free for the evolution and passage of the gas. This is accomplished by means of a screw of peculiar form suspended on a central spindle throughout the whole length of the retort, which screw is driven by steam power, and feeds itself from a hopper on the top, at the same time discharging the exhausted coke into a receptacle below, when it is removed by trucks, so that the coal is untouched by hand from first to last."

The advantages are said to be economy in space, fuel, and labor, together with an increased yield and greater freedom from sulphur. This method of carbonizing has been tried experimentally on a small scale, and the results have induced the process to be looked upon with favor by some of our best practical gas engineers. I am informed that the invention is about to be tested upon a more extended scale at the works of the Chartered Gas Company. As I have not witdessed the experiments myself, I should not feel justified in offering an opinion upon the merits of this system.

It will be remembered that at our last meeting Mr. Somerville, in the course of his paper, "On the Cause and Prevention of Choked Ascension-Pipes," stated that if "ascension-pipes were cast double, or having a jacket surrounding them with a constant circulation of water or air from top to bottom, stopped pipes would be unknown."

Now, it appears that this idea had also occurred to one of our Translantic brethren, who, it is said, had been impressed with the notion some time previously, and by a curious coincidence had matured his plan sufficiently to be in a position to make an application for a patent on the very day that M. Somerville addressed us at Dublin. The patent, however, bears the subsequent date of November the 28th, 1871.

[Mr. Church refers here to the invention of Moses Coombs Jr., figured and described by us December 2d, 1871, the coincidence he speaks of having been mentioned in an editorial of ours in that issue.—Ed.]

The mention of this subject naturally leads me to draw your attention to another invention, a model of which is now before you, and which has for its object

also the prevention of choked ascension-pipes, or, in the event of their becoming choked, affording ready means for the removal of the obstruction. This, the inventor, Mr. Box, proposes to do by making the ascension-pipe of comparatively thin wrought iron tubing, which he believes will be far less likely to become heated to such a degree as to convert the tar into pitch than it would if made of cast iron of the ordinary thickness. Should this pipe, however, become choked through any unforseen cause, an arrangement is provided for removing the offending pipe, and replacing it by another in a remarkably short time, leaving the foul pipe to be cleaned out at leisure.

Messrs. Fenner and Versinoun have lately patented an invention for manufacturing anthracene, samples of which are on the table for your inspection. Anthracene is a solid chemical compound made from the tarry residuum of the manufacture of gas, and since the discovery was made about three years ago that it might be converted into alizarine—which is the coloring principle of madder—it has become a highly important article of commerce. Up to the present time the supply of anthracene has been limited, owing to the means of its production being limited. It has hitherto been obtained only in the distillation of gas tar, when it passes over with the least fraction of the oil, and from which it is afterwards separated. By the new process, as stated by the patentees, anthracene may be obtained by distilling coal-tar pitch, which yields about two p. c., or one ton, of anthracene from 50 tons of pitch. This article is in great demand, and its present market value is about £400 per ton; therefore, we may look upon this invention as an important branch of industry, which will increase the value of one of our residual products.

Another invention of considerable importance in street lighting has been introduced by Mr. Skelton, who has invented and patented a new description of lamp for street lighting. The principle of the invention is the application of reflectors, in order to bend down and utilize the amount of light which is at present wasted by upward radiation. It is manifest that the rays of light from a street lamp which now strike the eye of a spectator placed on the ground, are only a small portion of those actually emitted by the flame. The rays which pass through the upper portions of the sides of the lantern, or through its sloping roof, are entirely dissipated, or, at the best—when partially and imperfectly reflected by clouds or atmospheric particles—become visible only in the form of the lurid glare which overhangs a distant town. Mr. Skelton estimates that about two-thirds of the light given by the gas flames is lost in this way, and he has arranged strips of silvered glass in such a manner that the loss will be effectually prevented. The upper half of each side of the lamp, and the whole of each side of the sloping roof, are occupied by a frame, in which the strips are placed, with their reflecting surfaces downwards, in a manner somewhat analogous to the slats of a Venetian blind. The precise character of the effect produced will depend upon the distance of the strips apart, upon their width, and upon their angle of inclination; but the general result is—subject to small variations—that the street receives three times as much light as would fall upon it through lanterns of the ordinary kind. The frames holding the strips are glazed on both sides, and made dust-proof, so that the mirrors will not themselves become soiled or tarnished, and the reflector, as a whole, can be cleaned in the ordinary way, by simply wiping the glass. This plan has been most successfully applied to the lighting of Waterloo Bridge. It is a very great improvement, and in no department of gas lighting are improvements in this direction more needed.

Our coal supply, both present and future, must next claim our most serious attention. A report from the Royal Commission appointed to consider the subject has lately been issued, in which they assume 4000 feet as the limit of practicable depth in working, making allowance for waste and loss. This gives the quantity of coal still lying available beneath the surface of the United Kingdom as 90,207,285,398 tons—that is to say, considerably more than 90,000 millions of tons. This is exclusive of beds less than a foot in thickness. The hypothetical coal-beds of the south of England are also excluded from the calculation. But the estimate lies within still narrower limits, seeing that it is confined to areas within which the coal-bearing strata are at the surface, or have been proved by mining operations to underlie more recent formations. Geological principles lead to the conclusion that large tracts of coal exist under the Permian, new red sandstone, and other superincumbent strata, in districts where the fact has not yet been demonstrated by actual exploration. If these unexplored coal-beds are taken into account, they add 57,273 million tons to our reckoning, constituting a total of more than 146,000 millions of tons. If we extend the depth beyond 4,000 feet, we get still more; but, for the present, we leave that out of the account. Let us see, therefore, how long the 146,480 millions of tons will be likely to last. In 1869 the quantity of coal raised in the United Kingdom would amount to no less than 2,607 millions of tons at the end of a century. Upon this assumed rate of increase the whole quantity of coal reported available by the commission would be exhausted in 110 years. While it is admitted that Prof. Jevons's theory has up to this time nearly accorded with observation, the commissioners object to the supposition that the annual per centage of increase in the consumption of coal will continue unabated for any considerable period. Mr. Price Williams, who has given great attention to questions of this kind, and who has been employed by the commissioners in matters of calculation, lays stress on the fact that, although the population of the United Kingdom is rapidly increasing, yet the rate of the increase is diminishing. This is a principle which Professor Jevons has not recognized, and when it is applied in correction of his theory, the duration of the coal supply is extended to a period of 360 years, the estimated population of Great Britain at the end of that period being, 131,700,000. The commissioners also give a calculation based on an arithmetical instead of a geometrical increase in the rate of the consumption of coal, simply adding a constant quantitiy equal to the average annual increase of the last 14 years, taking that at 3,000,000 tons. Upon this basis the consumption of coal a hundred years hence will have risen to 415 millions of tons per annum, and our available supply would then be exhausted in 276 years, a period considerably shorter than that allowed by Mr. Williams, who, while taking a geometrical ratio also, reckoned that it would be a decreasing one. There is yet another view, which the commissioners regard as the extreme opposite to that of Professor Jevons. It is that from this time forward the population, of the whole country, and the consumption of coal per head of the population will remain constant, or will merely oscillate without advancing. Taking, therefore, the present consumption of 115 millions of tons per annum, the supply would be exhausted in 1273 years. This may be called the full length of our tether, and it is certain that we should feel an inconvenient tight ness long before the end was reached.

Supposing that coal could be worked at a greater depth than 4,000 feet—and the main difficulty is that of the very high temperature met with at such a depth—we might add 48,465 millions of tons to our store, including the quantity believed to exist beneath the Permian formation. Assuming the whole to become available, the 360 years allowed by Mr. Williams would be increased to 433; the 276 years based on the arithmetical ratio would become 324 years, and the 1273 years based on the theory of a stationary consumption would be lengthened to 1695 years. As the commissions observe, the whole question is subject to contlngencies which cannot be forseen, and every calculation involves something speculative. What science may do for us we cannot say; but clearly our coal supply is by no means inexhaustible.

Unfortunately our present supply of coal causes us far greater anxiety than anything that may hereafter happen from the exhaustion of the coal itself. We have abundance of good coal workable at controllable depths, but owing to the perversity of men, and the unsettled state of our colliery labor, the supply as now raised falls very far short of the demand. The consequence is that the market price has lately risen from 50 to 75 per cent. To gas companies this is the most serious matter that has ever happened. They have had to contend against a large increase in the price of labor of the men employed in gas-making, and this enormous rise in the raw material, in addition to the increased cost of labor, will most injuriously affect the dividends of gas companies, and must of necessity compel many of them to increase the price of gas to the consumers. In some cases this can be done, but in other cases companies controlled by statutory power are restricted to a low maximum price, and in numerous cases they are already charging up to their maximum. Consequently these companies are placed in a grave position, and cannot obtain relief without the consent of Parliament. The existing state of things should not be lost sight of in future legislation, for it is inconsistent to have a fixed and unalterable maximum selling price when the cost of manufacture is subject to the great fluctuations under which we are at the present moment so severely suffering.

Another matter of vital importance claims our attention. I refer to the growing tendency of local authorities to absorb the property and business of gas companies by powers conferred upon them by Parliament. In most cases the power of the local authorities is exercised in direct opposition to the wishes of the shareholders of the companies so absorbed. The Legislature, judging from the past, intend to countenance and assist all corporate bodies in effecting this object, and I think that we may fairly predict that in the course of a few years all the principal works in the kingdom will change hands in this way. In the present session of Parliament no less than seven corporate bodies have obtained compulsory powers to purchase the gas works in their respective towns. There have also been several transfers of works from companies to the local authorities, thereby disturbing a large amount of capital invested in private enterprise. There are, no doubt, good and legitimate grounds of objection to the existing state of these compulsory purchases, but I fear we are helpless in the matter, and must, therefore, in this case submit to the powers that be. At the same time we must prepare for these changes, and put our respective undertakings in such positions as that they may be able to bear the scrutiny, and of themselves to refute the highly colored, prejudicial, and over-wrought representations that are made in some cases respecting the property corporate bodies desire to become possessed of. We must be well prepared for these attacks, and be true to the interests we represent, and endeavor to obtain for the shareholders of our companies a sum that will adequately compensate for the loss of the property they have matured, and which they have most reluctantly to relinquish.

In concluding my address, I wish to offer to gas managers a few practical suggestions for their consideration. In our official capacities we are subject to much misrepresentation, and the public appear to view us with no small degree of distrust. In some cases it is alleged that we pump air into the gas, in others the complaint is made that, although the price of gas is much cheaper than it was formerly, gas bills are heavier than ever; and it is strongly hinted that either something is wrong in the meter, or that some legerdemain is practised by the representatives of the gas company supplying them. Cousumers also complain of insufficiency of pressure, blackened ceilings, and a number of other defects. In practice, you are aware that in nine out of ten cases of complaint the cause is some local defect; it is often either improperly constructed, or worn-out burners, which consume, in many cases, double the quantity of gas that good burners would, and yet give only half the volume of light. Low illuminating power and blackened ceilings mayalso be traced to the same cause. Defective pressure frequently arises from cheap, ill-constructed gas fittings, and pipes which are quite insufficient to convey the quantity of gas required to give an adequate supply. In these matters gas companies are, as compared with water works companies, placed at a disadvantage, inasmuch as the water companies have full power and control over the size and strength of pipes, and the character of fittings used by the water consumers. But in the case of gas companies no snch power is possessed, the matter being left in very many cases to unskilful gas-fitters, whose object is to obtain the largest amount of profit on the smallest amount of charge to customers, who demand cheup work. Hence the most paltry and unsuitable fittings are frequently used, which forms a source of constant complaint, and the consumer, from want of knowledge and appreciation, considers the default due to defective pressure.

In these matters I am constrained to say that, as a rule, the consumers have been left to take care of themselves, the gas manager considering that his duty was only to give a proper supply of gas to the meter, and, beyond that, he has no concern, the internal fittings of a house being a matter solely for the consumer to attend to. This conclusion may be correct, but it cannot be a good policy to act upon it in practice. I think it would be most beneficial to gas companies if their officers were to educate gas consumers, and to teach them the proper and most economical use of gas, advising them to have none but proper materials and workmanship. If this were done, we should not have so many allegations as are now made by consumers against companies, and the use of gas for cooking and other purposes would be more general than at present.

With regard to the manufacture of gas, every possible care must be taken to supply it in a pure state and of good illuminating power. We must not lose sight of the fact that chemistry has made considerable advances of late years, and the tests now used to detect impurities are much more searching and delicate than they were. The science of chemistry should be better understood by gas managers than it is at present—in fact, it becomes a necessity, since we have metropolitan gas referees and duly qualified officers in various parts of the kingdom, who give their official reports of the quality of gas supplied to the local authorities, and otherwise detect our shortcomings. We ought not to complain of these severe tests, but hail them with satisfaction, and work hand in hand with inspectors and chemists to make perfect the source of that light which has undoubtedly become one of the great necessities of the age.

We are particularly indebted to the metropolitan referees, and to the engineers who have assisted them, for the valuable practical reports they have made from time to time; and the last, on sulphur, to which I have before alluded, demands the careful attention of the gas manufacturer. Sulphur compounds are highly objectionable, and it has become a *sine qua non* that a process of purification must be introduced to prevent any sulphur compound reaching the point o

combustion at the burners. In considering this sulphur question attention must also be paid to its formation. A prevailing opinion exists that the high temperature at which clay retorts are now worked eliminates these products in larger quantities; whilst, on the other hand, some chemists of considerable standing are opposed to this theory. For instance, Berthelot has shown that bisulphide of carbon is dissociated into its elements quite powerfully at a bright red heat; and Sidot has published some experiments (in *Comptes Rendus*, vol. lxix., p. 1303) wherein he shows that *more* bisulphide is formed at a dull red heat, and that at a heat approaching whiteness *none* is formed; also that moderate redness is the most favorable condition for its manufacture.

[Mr. Church has here appropriated a little of "our thunder," the last sentences being quoted almost *verbatim* from our own editorial on the Referees Report, of May 2nd, p. 142. We thank Mr. C. for the compliment.]

These conflicting views require to be reconciled, for they cannot both be correct. It should, therefore, be the careful study of the gas manager to endeavor to reconcile them, and to find out in practice where the truth lies. Other points requiring attention are condensers and scrubbers, which must be carefully examined and studied, and where they are found to be deficient they must be improved and brought up to the standard of perfection as far as can be attained. Proper and complete apparatus is absolutely necessary in every works. Each minute point of construction and working details demands the most scrupulous attention, in order that the ultimate results produced may be satisfactory. The progress of science demands that gas managers should make themselves thoroughly acquainted, practically as well as theoretically, with the chemistry of coal gas in all its minutiæ, especially with regard to the more prominent points I have indicated. By these means, and by the light of the reports of the gas referees, I trust that ere long the members of the British Association of Gas Managers will be as successful in producing chemically pure gas as they have been in working the large amount of capital entrusted to their care, and which they have done with such satisfactory commercial results. These results will be in no way impaired; but, on the contrary, cannot fail to be improved ny a study of the teachings of science, whose fixed and inexorable laws can never be neglected with impunity.

The Eveleigh Process.

[In view of the great interest just now excited in this matter, by the reports and discussions that have occurred in England regarding it, we have judged it desirable to reprint part of the specification. The description of the drawings, as we cannot reproduce the latter, is omitted.—Ed.]

443.—George Eveleigh, of 16 Asylum Road, Peckham, in the county of Surrey, consulting chemist, for "*Improvements in the manufacture and purification of gas, and in certain parts of the apparatus employed therein.*" Patent dated Feb. 21, 1871.

This invention relates to the manufacture and purification of gas generated from coal, shale, bitumen, petroleum, turba, peat, wood, and in some cases water or other analogous substances, and refers in part to certain improvements in the means and apparatus for which letters patent were granted to the present patentee, dated the 7th day of January, 1869, Number 45.

The present improvements consist in distilling from one or more of the said substances in a suitable retort, at a comparatively low temperature of about 600° to 1,000° Fahrenheit, the best and richest portions of the gas contained in such substances, together with the oleaginous, tarry, and other vaporizable matters, the residue remaining in the retort being coke of a superior quality. The rich gases, together with the said vaporizable matters, are conducted from the said retort by suitable pipes in a manner somewhat similar to that ordinarily practised, but instead of the usual hydraulic main a large cooling-tank is by preference employed, wherein the chief portions of the oily and other vaporizable matters which which come over with the gas are condensed as quickly as possible, allowing the rich gas to pass on into a peculiar cooler and condenser of the following character:

A large covered tank about half filled, more or less, with water receives the gas upon the surface of the said water, from the pipe leading from the first-named cooling-tank, which may or may not dip slightly into the water therein: the gas coming in contact with the extended surface of water is still further freed from depositable substances, and when thus freed becomes lighter, rises to the top of the tank, and passes off at the opposite end by a pipe, the mouth of which rises nearly to the tank; this gas may be further cooled if needful by passing through pipes immersed in the water of the same or another tank, and from thence led to the usual lime or other purifiers. The larger proportion of the oleaginous and other vapor which is, as above stated, deposited or condensed in the first mentioned cooling-tank, and the remainder which is deposited or condensed in the second cooling-tank and condenser, are then collected and conveyed into another tank from which they are caused to flow gradually into a heated pan, when they are revaporised at a suitable temperature, and from whence the vapors so reproduced are passed through one or more of the redistillation retorts charged with the chemical purifiers in the manner described in the specification of the patent of the 7th day of January, 1869. In the redistillation retort or retorts the said vapors are converted into gas, which is more or less purified therein as may be desired. From the redistillation retort or retorts the gas is passed through a cooling-tank similar to that first above mentioned containing water, wherein any of the oily or other vapors which have not been converted into gas by their passage through the redistillation retorts are again condensed, and may be returned to the revaporizing pan and redistillation retorts for further treatment, and so on again and again until the whole is decomposed or only pitch remains. From the cooling-tank this gas passes on to the condenser above described, mixing on its way, if desired, with the rich gases coming over direct from the first distilling retort, and passing on with them to the lime or other purifiers, and thence to the gasholder for use, or it may be kept distinct from the gases coming direct from the retort, and treated in a separate series of coolers, condensers, and purifiers, if needful, and passed direct to the gasholder. By this process the patentee states that he is enabled to employ a low temperature in order to obtain the best and richest portions of the gas from the coal, and by the treatment of the oily, tarry, and other gas producing vapors in the manner described, he fully utilizes them and obtains the remainder of the gas which they contain, and in most cases by these means he not only produces a larger total quantity of gas from a given quantity of coal, but the illuminating power and purity of the gas so produced are much greater than can be obtained by the ordinary process in which a great heat is employed. The value of the residual products, such as the coke and pitch, is also greatly increased.

The patentee says he is aware that a low temperature has before been employed in order to obtain a gas of high illuminating power and purity, but the methods heretofore adopted have not been commercially successful, chiefly in consequence of the small quantity of gas that could be produced by such means.

By the means hereinbefore described, he states that he is enabled to produce an aggregate quantity of gas equal to and in some cases greater than can be obtained by the process now in use in which high temperatures are employed, while the illuminating power and purity are considerably greater.

He is also aware that attempts have been made to produce gas from hydrocarbon oils and tar, but heretofore subjected to destructive distillation after their formation at a high temperature, whereby very much of their valuable gas-yielding qualities have been sacrificed.

By the process herein described the hydrocarbon oils and tar are subjected to destructive distillation after they have been produced at a low temperature and condensed so as to retain as much as possible of the valuable qualities heretofore lost.

The claims are—

1. The production of rich gas together with the oily, tarry, and other gas producing vapors by the primary distillation, the treatment of the said rich gas, and the oily, tarry, and other gas producing vapors resulting from such primary distillation; and also the secondary distillation and treatment or conversion into permanent gas of the volatile constituents of such vapors, substantially as herein described.

2. The general arrangement and adaptation of the retort, cooling-tank, and condenser composing the apparatus for effecting the primary distillation and treatment of the rich gas and oily and other vapors, substantially as herein described and shown.

3. The revaporizing pan in connexion with the redistillation retort or retorts, substantially as and for the purposes described and shown.

4. The combination of the apparatus for effecting the primary distillation and treatment of the rich gas and oily and other vapors with that for effecting the secondary distillation and treatment or conversion into permanent gas of the volatile constituents of the oily and other vapors, substantially as described and shown.

Hear both Sides.

[We have before called attention to statements of a French physician, Pigeon, which would give us pause, with regard to the salubrious properties of carbolic acid. For this we have been laughed at. Facts multiply, however, and "Truth is the daughter of Time." We do not decide, but only give both sides.—Ed.]

Carbolic acid has occupied the minds of physicians and health boards ever since its properties were known. As a disinfectant and preventive of contagion its effects are widely acknowledged, and yet many observers prefer other remedies. Its poisonous properties when taken into the system are generally known, but only recently has it been accused of having produced poisonous effects by absorption when used as a dressing for amputations or other wounds. Dr. Mary C. Putnam, of New York, has recently called attention to this subject in an address before the Medical Library and Journal Association. In her remarks she referred to her experience in the hospitals of Paris, where she spent several years, and where she observed many examples which proved its use to be injurious rather than in its favor. In these for wounds carbolic acid dressings are commonly used to prevent the absorption of putrid matter into the circulation, but this treatment has often resulted unsatisfactorily. Dr. Labbee's paper, giving his experience in English hospitals, is cited to prove her views, in which, notwithstanding all his care, all his amputated patients to whom carbolic acid dressings had been applied, had died. Dr. Putnam further remarks:

"This lugubrious statement corresponds entirely with the facts I have had an opportunity of observing closely. For at least three years, the use of carbolic or phenic acid has been almost universal in the great surgical wards of the Paris hospitals; but the mortality has not been notably modified, and remains higher than that of London.—*American Exchange and Review.*

Gas-Light in Central Park.

At a special meeting of the Board of Aldermen recantly, a short but very sharp discussion took place on the subject of lighting the Central Park at night. The Common Council has no power over the management of the Park, but one of the Aldermen offered a resolution to request the Park Commissioner to light the Park as an accommodation to those people who have no time to go to the Park during the day. One or two members were strongly opposed to meddling with an affair in which they had no authority, and thought the idea of lighting the whole Park was a ridiculous one. Mr. Gilsey said the Park would never be complete until provision was made for lighting it at night. The originator of the resolution urged that it be passed as an expression of the wishes of a majority of citizens. A motion to refer it to a committee was lost, and the original resolution was adopted as read. —*Daily Paper.*

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

A Question of Patent Right.

[We present the following to our readers, just as it is, without feeling competent, in the lack of search through the past history of the whole art, to render any opinion on the question of fact, but shall hope to hear from some reader who has had occasion to make such search.—Ed.]

Boston, July 8, 1872.

Mr. Editor: Since the attention of the public, more particularly Gas-Light Companies, was called by the American Coal Gas-Light Improvement to the subject of the deleterious effects produced by the dip-pipe seal, in the manufacture of illuminating gas, there have been numerous devices brought forward, designed to accomplish the end for which Letters Patent were granted to William Gibson, on the 5th of October, 1869.

Some of these mechanical devices have been patented, and possess more or less merit. As mechanical devices the claims of some of them can doubtless be sustained, while others are, evidently, subject to previous claims.

A mistaken notion seems to exist in the minds of some of these inventors and patentees, in relation to the claim of Mr. Gibson, viz., that it is for a particular mode of doing the particular thing for which letters patent were granted to him in 1869. His claim essentially, is for a mode of making illuminating gas, by which the dip-pipe seal is dispensed with, and a cut-off substituted for it during the time of drawing and charging the retorts, and not for any particular kind of valve, or cut-off. Any claim therefore for this purpose is subject to his claim.

By means of a cut-off, or valve, Mr. Gibson successfully accomplished that which had never been done before. His claim does not rest upon a mechanical device for an improvement in the manufacture of gas, or a theoretical method of accomplishing this object. But upon the conception of an improvement, successfully applied, and put into daily use, for others to imitate, by which the cost of the product is reduced and its quality improved. If hundreds of others had thought of doing the same thing before, and even devised, as some did, methods of doing it, this would not affect his claim, for no gas works were ever before operated by the method instituted by him, and brought into successful use, at the works of the Cambridge Gas-Light Company. Previous to the time referred to, the dip-pipe was not only considered an indispensable requisite in all gas works, but the influence it exerted in causing the deposit of hard carbon within the retorts, and reducing the product of gas, from the coal used, was not appreciated.

Mr. Gibson not only introduced a mode of manufacture entirely novel, and practically applied it, but he demonstrated its importance, and proved its value, in works constructed on an extensive scale, and published his results to the world. Gas engineers were reluctant, at first, to credit these results; when, however, the evidence presented was conclusive, there were those among them who thought to evade Mr. Gibson's patent by a modification of one of the mechanical devices which he had used to accomplish his object. But (in the language of the Commissioner of Patents, the Hon. M. D. Leggett) "the test of invention is the result attained. "In other words, if an improved result is produced, or if the public is supplied with a better article, or if the same article is produced in a cheap, or quicker, or better manner, then patentable novelty exists, even though the devices are old by which the improved results are attained." A series of careful experiments satisfied Mr. Gibson that by introducing a valve, and avoiding the pressure produced by the dip-pipe seal, the quality of the gas would be improved, and an increase of yield obtained, and he contrived a simple method of accomplishing this end—proved that it was practicable, and put it into successful operation; all of which is covered by his claim in the letters patent referred to.

In a future number of the Journal I may, if you think it will interest your readers, give a brief description of all the mechanical devices for dispensing with the dip-pipe seal, for which patents have been granted, in this country and elsewhere.

Yours respectfully, J. H. B.

Rejoinder to Mr. Yorke.

Cambridge, Mass., July 10, 1872.

Mr. Editor: Mr. William Yorke, in a communication published in your Journal of the 2nd inst., refers to a report of some trials made by Mr. Edward Jones, Engineer of the South Boston Gas-Light Company, at the Cambridge gas works in 1871, to determine the value of the Gibson improvement in the manufacture of gas, as compared with the method in common use, and questions the accuracy of the station meter employed.

He might, with equal propriety, question the accuracy of the scales employed to weigh the coal used, or that of the photometer, or meter, and balance, and clock used in connection therewith.

As, however, the same station meter with its fixed water line always the same, was used in these trials, assuming it to be inaccurate it would not affect the comparative results.

Inasmuch as there have been numerous other similar trials made at other works, and by other persons, with similar results, which must have been known to Mr. Yorke, it is to be inferred that he supposes all the station meters used to have been inaccurate.

As regards the quantity of gas sold, he must be aware of the impossibility of determining it, in a trial of a few hours, or days, made for comparison; and, also, that if it were possible it would not affect the result, as the per centage of difference between the record of the station meter and the service meters would be the same, whether the gas was made with or without the dip-pipe seal.

It being customary to estimate the quantity of gas consumed by street lights, and to guess at the quantity consumed at the works, it is impossible to determine accurately what Mr. Yorke calls leakage. In no case, however, can there be what is properly called leakage to any very great extent, without its being made evident by the nuisance thereby produced.

Respectfully yours,

William Gibson,

Sup't of Works of the Cambridge Gas-Light Co.

Grease for Gas Fittings.

Lyons, France, July 16, 1872.

Mr. Editor: If you think it proper, you may insert the following in your next issue:

GREASE FOR GAS FITTINGS.

Dissolve one pound India rubber (not vulcanized rubber) in two pounds neats foot oil; the oil being carefully heated. Add one pound bees wax, mix when warm; let the mixture cool, and you will obtain the best grease for lubrication of gas stop-cocks, valves. etc. This grease has both valuable qualities of preserving the metal from gas corrosion, and of having a very prolonged influence.

Yours truly,

A. de Lachomette, Engineer.

Chili Coal.—Important discoveries of coal along the Gulf of Aranco, Chili, are reported; particularly on both the banks of the Carampagne River near its mouth, where they intend working the mines. The coal is of good quality, and said to be found in abundance.—*Coal and Iron Record.*

Explosion.—About half past four o'clock on the morning of the 9th inst., the gas receiver at the North Pennsylvania Iron Works exploded, killing three men, and, it is reported, injuring several others. The engine house is a perfect wreck.

Fires in Coal Mines.

FIRE IN A TENNESSEE COAL MINE—HOW IT WAS EXTINGUISHED.

The ventilating flue of the Rockwood Coal-bank caught fire last Tuesday night, and burned most furiously until Saturday, when, by the most determined exertions it was extinguished. The flue goes up from the rooms below, through over 100 feet of solid coal; a fire is kept at the bottom of this shaft to stimulate the draft, and it is supposed, communicated to the surrounding coal. The rooms below being so large, it was found impossible to shut off the supply of air from below, and the white blaze shot up over 100 feet into the air. The plan used to extinguish the fire, was to dig out the burning coal from below and put it out with water brought in buckets from the drain in the interior of the mine, some 300 feet distant. Fifty men were kept at this day and night, from Wednesday morning until Saturday at noon. The fire had penetrated over thirty feet into the solid coal on one side, and only five or six feet on the other, and to dig out this mass of red-hot coal was terrible work. Water had no effect on it until it was dug loose, and the heat and steam was suffocating; but the men, led by Capt. Harris (the coal boss,) worked with a will, and succeeded in saving the great coal property. The heat was so great as to melt the slate roof, which dripped down in waxy puddles, hardening into masses of lava-looking cinder. The Company are now erecting a brick stack outside of the bank, at the mouth of the ventilating shaft, in which the fire will be kept, precluding any possibility of the fire coming in contact with the coal again. The long dry season we have had dried the coal so thoroughly as to cause it to ignite. Ordinarily the coal is kept wet with surface water oozing through it, but this year has been so dry as to do this.—*Chattanooga* (Tenn.) *Herald, June* 26.

THE ATWATER COAL MINE DISASTER—TEN MEN SMOTHERED TO DEATH—FOUR BADLY BURNED.

The Atwater coal company is a Cleveland corporation, its officers being John Hutchins, President; William Hewitt, Vice President; S. A. Fuller, Secretary; A. K. Spencer, Treasurer. All these names will be readily recognized as those of well-known Cleveland citizens. This company has recently reopened a new mine in Atwater township, two and a half miles from Lima, on the Pittsburg railroad, to which station it has built a private railway for transportation of its coal. The coal is reached by a "slope," which penetrates the "bank" for 160 feet, and which is protected from "caving" by wooden supports and roof, like the great majority of such mines. Between one and two o'clock on Wednesday afternoon, while fourteen men and one mule were at work in the mine, the entrance to the slope was discovered to be on fire, but from what cause we have no present means of ascertaining. Four of the alarmed men in the mine rushed out through the slope, getting considerably burned in so doing, but all of them will recover in the course of time. The remainder of the men could not effect their escape, and were of course smothered in the slope. A telegram was sent to Ravenna for assistance in extinguishing the flames, and the entire fire department of that place, accompanied by the Mayor, promptly responded to the summons. The President of the company was on the way to Cleveland from the mines when the fire broke out, but was recalled by a telegram which reached him at Ravenna, has been continuously at the scene ever since, and has been doing everything within the limits of possibility which duty and humanity demanded in the premises. The people of the entire surrounding country, with sympathies keenly alive to the requirements of the occasion, flocked to the scene by scores and by hundreds, and also rendered timely and energetic assistance in such directions as it was needed. As soon as the case would admit efforts were resolutely made to reach the imprisoned victims, but so much mischief had been wrought by the flames, which were not fully subdued until Thursday afternoon, that the progress was necessarily slow and discouraging, and it was not until Thursday noon that the first body was reached. By Thursday night six more were recovered, since which time we are not aware that any more have been found. —Cleveland *Herald*, July 6.

The Temperature at the Sun's Surface.

A number of eminent scientists are at present engaged in the solution of this interesting problem. The results thus far announced are extremely unsatisfactory; some of them differing very widely. As an instance of this difference in opinion, it may be

[*For continuation see page* 46.]

THE AMERICAN

GAS-LIGHT JOURNAL

AND

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FRIDAY, AUGUST 2, 1872.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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MR. CHURCH'S INAUGURAL.

Our readers have this comprehensive document now before them, not far from complete. On reading it again, some points attract attention, which it would be profitable to remark upon—a very few of which we shall essay on.

The Referees' Reports he gives much space to, and does them a considerable measure of justice, though we think he is not wholly fair to that on Burners, in saying that "no new facts are set forth that can claim *our* attention." Admitting this even, our own view has been that it was the referees province to instruct the community generally, and not the gas fraternity alone. Mr. C's exposition of the views set forth by the referees on ammonia and scrubbers, is both condensed and lucid, and we recommend it to our readers as a fine annotation on the original (which they have already had).

ANTHRACENE, used now for making artificial madder colors, one of the wonders of modern chemistry, it seems, according to Mr. Church, is in great demand, at about $1 per lb., and a ton of coal-tar pitch contains some 45 lbs. of it. This looks to the promise that our coal tar, now a drug, may soon be worth much more than $2 per barrel.

The Skelton reflector lanterns, we have formerly alluded to. They seem highly ingenious, but we think some of our Yankee inventors will quickly beat them, now that the value of the principle (no new one) seems conceded. The calculations about the British coal supply are suggestive of the interest that would attach to some similar figures relating to our own resources in this direction. Such we have indeed made, and will soon present.

With regard to the *current supply* of coal in Great Britain, which has so much interest in gas circles, from latest accounts it has taken another jump—steamers have raised their rates of fare—iron and all other materials will soon rise at least 50 per cent.—and all the world will feel this disaster! The worst is, that no expectation is held of any future restoration of former rates. Coming events cast their shadows before.

Mr. Church is lugubrious as to the prospect of an universal seizure by municipal authorities of all British gas-works. His advice as to how to resist or at least mitigate this catastrophe seems good. Are we, in this country, going to take time by the forelock, and prepare? More again.

GAS FOR COOKING AND HEATING.

Let us hope that *forsitan futuro*, perhaps in the future, there may yet arise, from among the many ingenious, learned, and skilful members of our American fraternity, a deliberative body in which so splendid and exhaustive a discussion may be possible as that on Mr. Hartley's paper on "Cooking by Gas," at the last meeting of the British Association. In time our readers will have it in full; but we shall anticipate somewhat by saying that every point received full attention, every advantage of this application, so little known, and yet so full of capabilities, was rated at its due value, and every drawback, real or imaginary, was sifted, and practical means pointed out of obviating the real ones and evading the fanciful ones. Nothing could more strongly convince us that we were correct in the opening sentence on this same subject in the last issue, that calorific applications of gas must soon reach, everywhere, a stupendous development. Here, in America, especially, where we are never to be disturbed by a *permanent* and *increasing* appreciation in prices of gas coal, these applications are to have their most rapid and vast est development.

THE "EVELEIGH PROCESS."

In this issue, the Specification of the patent is given, on which this method is founded. Mr. Church gives also, in his inaugural, a concise exposition, which is a useful appendage to the specification. The first one of the papers read, however, to the recent convention of the British Managers, was an elaborate Report by Mr. Mellor, the Engineer in charge of the experimental apparatus on the Eveleigh system, which was followed by a copious discussion of the whole subject. In our next, Mr. Mellor's paper will be given, with a part, or the whole of the discussion, as space may permit. In this discussion, though there were, as was to be expected, cavillers and skeptical voices, yet it is clear that a general tone of fairness prevailed, and a tendency to admit such facts at least as were vouched for by distinguished members of their own body from their own actual observation, with manifestations of much surprise at these facts. The Eveleigh process will be again referred to, by way of illustration, in the editorial columns today, in connection with another matter of great importance and of purely American origin.

In the above-named discussion, the success of the general principle, upon which this process (with some experiments of much older date by other inventors) is founded, was clearly conceded by several of the eminent gentlemen present, to have been fully and conclusively demonstrated. This is a great step gained and settled. But still a very important hitch occurred. It was pointed out and insisted on, by a number of these gentlemen, and met with no satisfactory reply, that the process "consisted, in reality, of two distinct processes," involving the use of two fires. We may add also that the plan of allowing oily vapors, which are to undergo secondary decomposition into gas, to *condense* first and lose their heat, in order that they may require still another additional amount of heat in their *reconversion* into vapor, seems to us to involve a great flaw in the process, looking at it with a practical eye.

PRELIMINARY REPORT UPON THE "ELMER PROCESS."

Since the experiments made by Mr. Goodwin, upon the method of gas-making used at the Grand Central Hotel, published in this Journal of March 16th last, the undersigned has been engaged on several occasions in repeating Mr. Goodwin's tests—applying additional precautions—as, for example, chemical analyses and density determinations of the gas.

He now finds himself in condition to endorse fully the statements and conclusions of Mr. Goodwin; as being confirmed by his own tests.

In this brief preliminary statement, but few figures can be introduced. In one test, made with a fair quality of Youghiogheny Coal, the general results were 12,320 feet of gas per ton, of which the tests of candle power, under varying pressures, and with different burners, ranged from 18 to 20 candles, say 19 in the mean. Density of the gas equal 0·525. This gas contained no air; and no vapor of naphtha (of the petroleum series) could be found by analysis. The complete analyses must await the final Report,

In the course of this work, every instrument used was verified with the utmost care, and adjusted with all possible precision.

The Elmer process is one of that class of processes which, like the Eveleigh plan, described on another page of this issue, distills the coal at a comparatively low heat, producing in the first place, together with considerable gas of a rich quality, a large volume of *oily* products, these oily products being subsequently also gasefied. The peculiarity of the Elmer method is that these oily vapors are not first condensed, as by the Eveleigh, but pass at once into another empty retort set in the same bench, and heated by the same fire *to a much higher heat* than the carbonizing retorts.

Another very important point in the Elmer method is that superheated steam is also passed at a certain stage into the secondary retorts, being superheated in the same furnace ; the object of this being to remove *carbon*, which is always deposited more or less during the decomposition of the vapors. The water-gas thus formed passes on, to swell the volume of the whole gas. Drawings and specifications, with full explanations of all details will shortly appear in the Journal, to the full satisfaction of all enquirers.

The inventor believes that the result above stated is very much inferior to those that he has himself obtained ; and the writer can readily believe this, because he found himself subject to the drawbacks explained by Mr. Goodwin, and others besides, to be explained hereafter. On seeing the Report of Mr. Mellor, however, on the Eveleigh method, it will be observed that this figure is not inferior to his, obtained under much more favorable conditions. The facts must not be forgotten also, of the far greater simplicity of the Elmer method, and that Dr. Eveleigh has two fires to his one.

I wish therefore to congratulate the promoters of this enterprise upon the certain prospect that, with apparatus free from the defects and drawbacks we have alluded to, unprecedented success in realizing candle-power from coal, and with an unprecedented degree of economy, lies before them ; such as ought to ensure them a wide career of prosperity.

The final report, to be soon laid before the public, will embrace full particulars of series of experiments, with analyses of the gas, and all else that can reasonably be called for.

HENRY WURTZ.

MR. YORKE'S LETTER, IN OUR LAST.

In this, there was one highly important point discussed by Mr. Yorke, which we wish we could do justice to at this time. It appears, however, to have been already settled, and not in favor of Mr. Y's position, in an investigation made two years since by Prof. Silliman, of New Haven, published in *Sillimau's Journal* for November, 1870, and in this Journal of December 16, 1870, p. 178. Prof. S. found that hydrogen, at least, added to a rich gas, did not act like air, to depress the total illuminating power, but merely diluted it. As to the *sealed dip-pipes*, we acknowledge our oversight, and owe Mr. Yorke an apology.

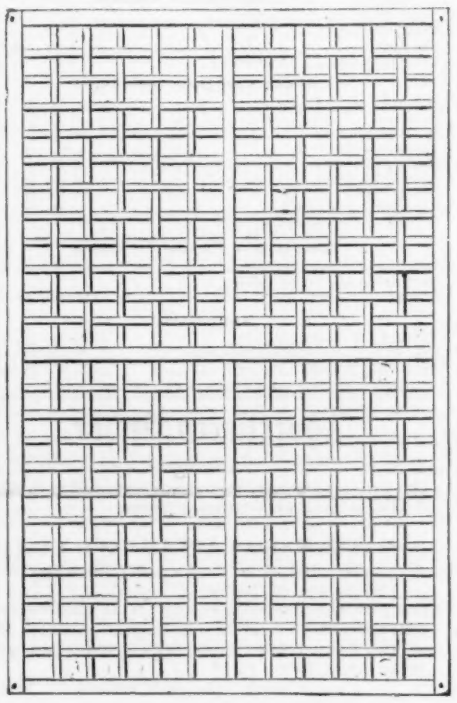
We wish here to add that may what have appeared harsh language in the former editorial, was in fact without due consideration, and without doubt arose from misunderstanding of Mr. Yorke. As these columns are open to all *courteous* discusslon on gas matters, we shall ourselves try likewiseto be courteous to all.

THE NEW POPULAR SCIENCE MONTHLY.

The Fourth number of this excellent serial has been sent us. Not having received the previous numbers, we can only judge from this that Prof. Youmans has organized and carried out an enterprise which entitles him to the thanks of all American scientists and friends of science ; as well as to the support of all educated Americans, who desire to see their country rank higher in the scale of civilization. Our crowded state prevents further notice to day, but we shall try hereafter to say more, and even to make extracts from the great mass of highly interesting and sterling matter presented.

AMERICAN

GAS SCREEN MAN'F'G COMPANY.



TO GAS-LIGHT COMPANIES.

Your attention is respectfully called to the GAS SCREEN now being manufactured by the American Gas Screen Manufacturing Company, under the patents granted to E. DUFFEE, and are pleased to submit the following points of their excellence and superiority over all other screens now in use.

The Screen is made with an oak frame, interlaced with split rattan, drawn through holes at regular intervals in the Frame and cross-pieces. the edges of the frame being grooved to prevent abrasion.

The advantages of the screen are :

1st. The large purifying surface, the construction of the Screen giving over three-fourths of the surface for the gas to penetrate the lime.

2d. On account of the free passage of the gas through the Screen the pressure is reduced, thereby preventing the accumulating of carbon on the retorts.

3d. The saving of lime and labor, as the Screens are not liable to clog, and are easily cleaned.

4te. Their cheapness and simplicity of construction.

5th. Their DURABILITY—they can be used longer than any other now used.

Testimonials.

PROVIDENCE, RHODE ISLAND, March 21st, 1872

LUTHER DAY, Esq., Agent, etc.

Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

The frames are well put together, and I see no reason why they will not last for a long time. The *very large amount of open space* in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great, and were gauges used more frequently than they now are in many gas-works, this fact of having *open Trays* would become more apparent to managers of gas works. The difference in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified. per bushel of lime used to this date, is six thousand five hundred and fifty six (6,556) cubic feet.

Respectfully yonrs,
JAMES H. ARMINGTON, Supt.

BOSTON GAS-LIGHT CO., Dec. 1871.

Dear Sir: In answer to your inquiry how we like your Patent Tray for dry gas purifiers, I take pleasure in saying we have used them exclusive of all others, for the last three years. and think them far ahead of any yet offered. The surface being nearly three times that of any other Tray, and their lightness and durability perfectly satisfactory.

Yours respedtfully,
A. M. GILES.

EDWARD DUFFEE, Esq.

EAST BOSTON, JUNE 15, 1871.

Gentlemen : We have used your Screens some five years. They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen. Yours truly, A. M. NORTON, Supt.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE.

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly, JOHN ANDREW, Sup't.

DORCHESTER, March 3. 1870.

Mr. E. DUFFEE.

Dear Sir: We have had your Gas Trays in constant use for almost one year and six months, and find them superior to any others we have ever used, both in point of economy and efficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870.

EDWARD DUFFEE, ESQ.

Dear Sir: Yours of the 20th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.,
SPRINGFIELD, MASS., Oct. 10, 1871.

Mr. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable, and recommend them to your consideration.

Yours with great respect,
GEORGE DWIGHT.

ROXBURY, June 14, 1872.

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Yours respectfully,
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KIDD'S PATENT.

Specification Claim—"An adjustable aperture or cock, placed in any part of the exit pipe, between the decomposing retorts and the exhausting apparatus, or any equivalent of the same for allowing atmospheric air to be drawn into the exhauster with the gas."

KIDD'S VAPORIZING PROCESS turns all the Naphtha into vapor, leaves no heavier grade or residuum, gives an equal pressure or flow of vapor to the retorts, makes a greater quantity of gas, more permanent, and of richer quality than when vaporized in a still.

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JAMES A. WHITNEY, late Editor of the *American Artisan*, and for four years past President of the New York Society of Practical Engineering, has opened an office as

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Mr. Whitney has had a practical experience of more than twelve years spent in pursuits directly connected with industrial operations and Patent Agency business, which will enable him to care for the interests of his patrons in the most satisfactory manner. 9t8

[*Continued from page* 43.]

said that the famous astronomer and spectroscopist, Father Secchi, maintains this temperature to be about ten million degrees Centigrade.

At a recent seance of the French Academy, in defending his estimate against the much higher figures of Ericsson, Zollner and Faye, St. Claire Deville asserted that he was engaged in investigating the subject, and that his results fixed the temperature at about three or four times the melting temperature of platinum, about 6000 to 8000 deg. C. Mr. Vaulle also announced an ingenious theory upon the same subject, fixing the debated figure at 10,000 deg. C. Finally M. Fizeau stated that having compared the solar light with that of the carbon points of the electric light, he had been able to estimate that the former was about three times as intense as the latter, and hence, assuming the relative calorific intensity to be in proportion to the luminous intensity, he had arrived at the figure of 8000 deg. C. as the correct one.

[In this connection, the following paragraph from one of Ericsson's recent papers will be *apropos*.]

The fallacy of Dulong's formula relating to high temperatures having been conclusively shown, it will not be necessary to examine the calculations of Messrs. M. E. Vicaire and Sainte Claire Deville, presented to the Academy of Sciences at Paris. Besides, the question of solar temperature cannot be properly investigated without considering the leading points connected with the propagation of radient heat through space—a subject of too wide a range to be discussed in this article. It should, however, be mentioned that the result of the measurement of solar intensity March 7, 1872, before referred to, proves the correctness of our previous demonstrations, showing that the temperature of the surface of the sun is at least 4,036,000 deg. Fahr.

Dr. C. Elton Buck, on the Vernon-Harcourt Method of Purification.

In the manufacture of coal gas it is an object of the highest importance to remove as many of the sulphur compounds as possible. The ordinary methods of purification, whether by means of hydrate af lime or oxide of iron, are efficient in eliminating nearly all the sulphuretted hydrogen, but are wholly inoperative as regards the expulsion of bi-sulphide of carbon, which is equally injurious, and which on burning the gas, evolves sulphurous acid. It has been found in the periodical tests made of London gas, that nearly half the sulphur is contained in the form of bisulphide of carbon, and many plans have been devised to insure its removal.

Several years ago the Rev. Mr. Bowditch, rector of Wakefield, who, although a clergyman of the established church, is nevertheless a gas chemist of no little reputation, proposed to pass gas through heated clay, which he averred had the power of splitting up the bisulphide into sulphuretted hydrogen and carbonic acid, which are readily absorbed by the lime in the purifiers. Mr. Lewis Thompson, one of the most eminent chemists, and author of Chemistry of Gas Lighting, thoroughly examined the process of Mr. Bowditch, and pronounced it a failure in every respect. These experiments were made eleven years ago.

Recently a Mr. Harcourt has revived the idea that by passing impure coal gas through a red-hot tube, the bisulphide of carbon may be decomposed as above described. It is said that crude gas thus treated is not only rendered pure, but that its illuminating power is greatly increased. But, it seems to us, that this is the mere revival of an old idea, and we cannot see why the benefits now expected to flow from the adoption of the process, should not have been realized when they were first promulgated several years ago. —*Amer. Exchange and Review.*

RECENT AMERICAN PATENTS.

Pertainsng to the Specialties of this Journal, to date ending June 22, 1862.

127,089.—Carbureter.—J. B. Fish.
127,035.—Sealing Dip-pipes of Gas Apparatus.—J. R. Farnum.
126,974.—Water Meter.—E. Marsland.
126,981.—Water Meter.—H. Olney.
127,126.—Water Meter.—W. O. Wakefield.
127,329.—Gas Burner.—F. A. Fisher.
127,366.—Carbureter.—C. H. Pierson.
127,250.—Ammoniacal Gas Engine.—W. H. Laubach.
127,144.—Gas Retort.—L. Blair.
127,162.—Gas Apparatus for melting Snows on Sidewalks.—Folkman and Kolgen.
127,245.—Gas Machine.—J. Kaufman.
127,381.—Gas Retort.—T. G. Springer.
127,280.—Fastening for Retort-lid.—G. Stancliff.
127,929.—Light Intensifying Attachment for Gas Burners.—S. T. Bacon.
127,798.—Self sustaining Gas-bracket, Lamp-stand, etc.—C. Robb.
127,856.—Screens for Coal Gas Purifiers.—G. W. Day.
127,942.—Water Meter.—Wheeler and Lane.
127,768.—Stop Valve for Water Pipe.—J. L. Hewes.
127,859.—Waste Water Pipe.—Conver and Koons.

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[Reported Expressly for this Journal.]

AUGUST 2, 1872

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Jersey City Gas Meter Works, 14 Morris st., Jersey, N. J ... 3
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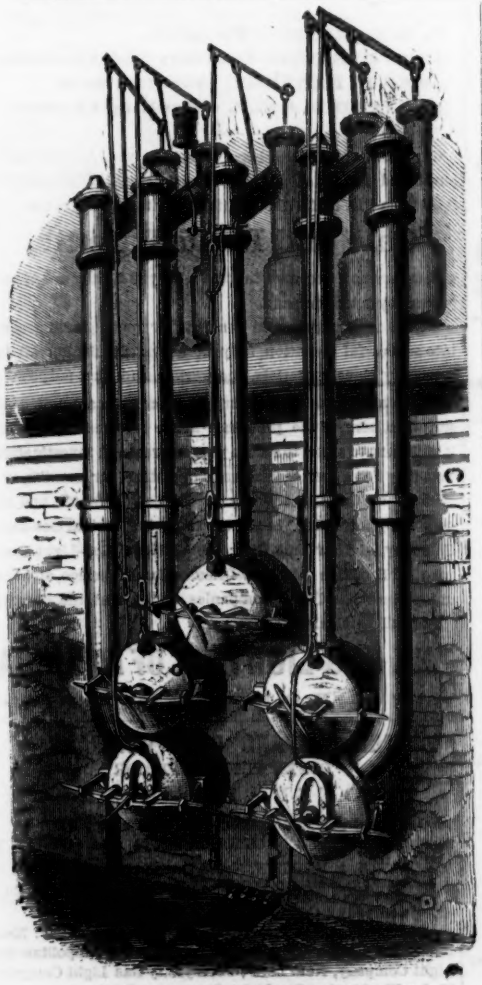

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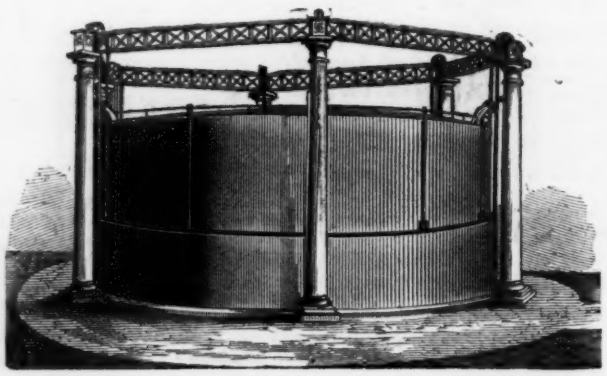

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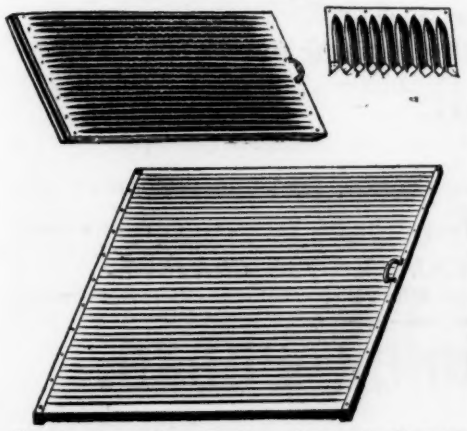

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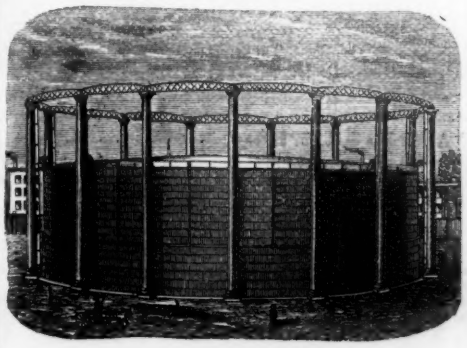

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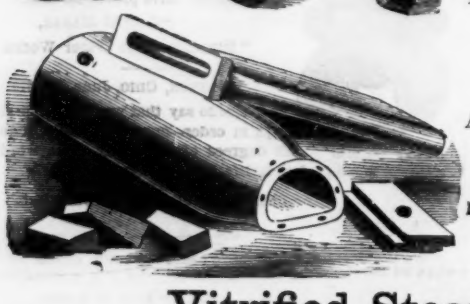

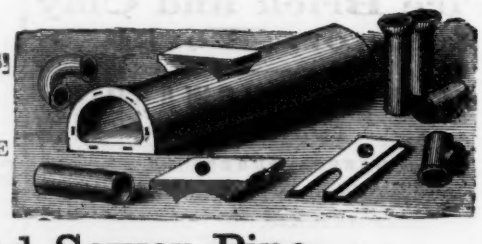

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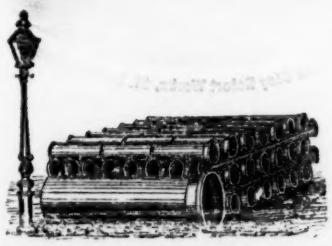

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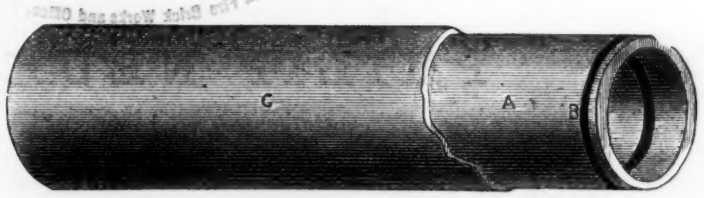

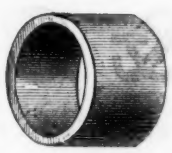

FIG. 2.

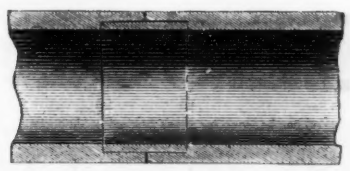

FIG. 3.

A—Cylinder of Wood. **B**—Band of Iron. **C**—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3.—Horizontal Section and Connection.

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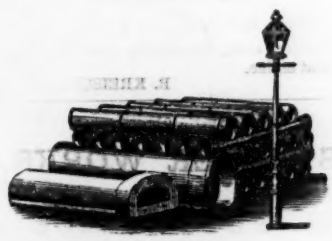

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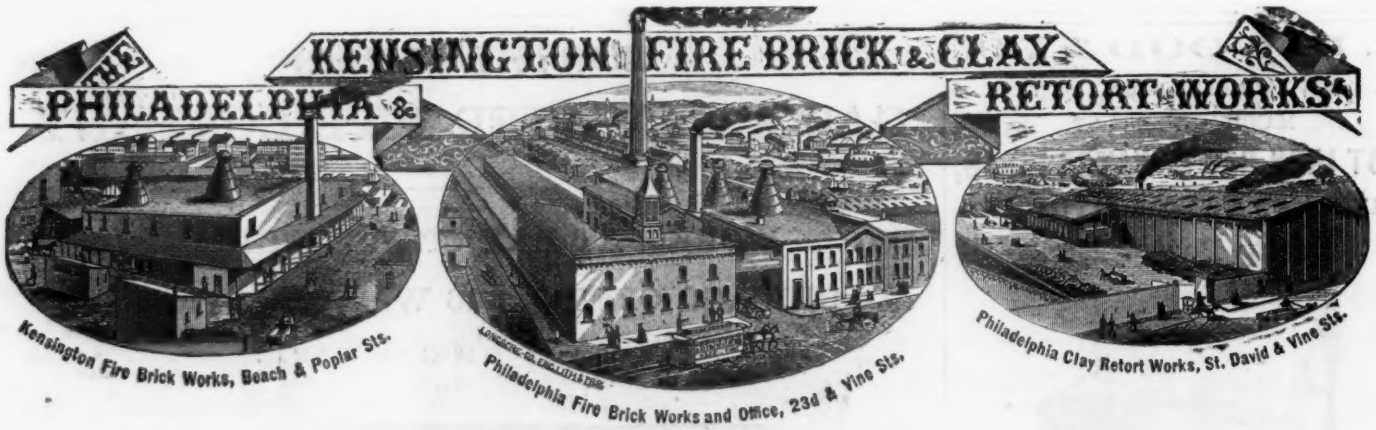
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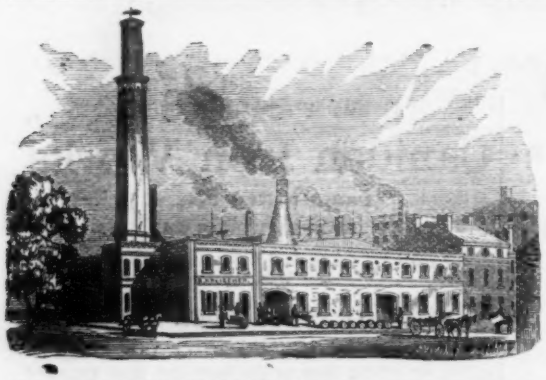

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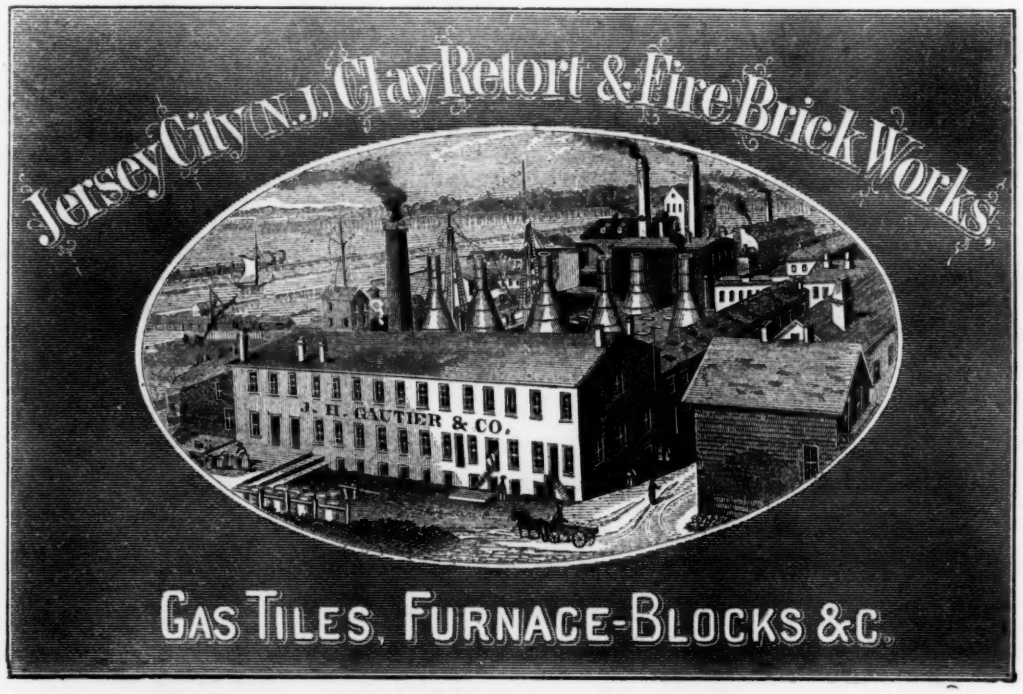

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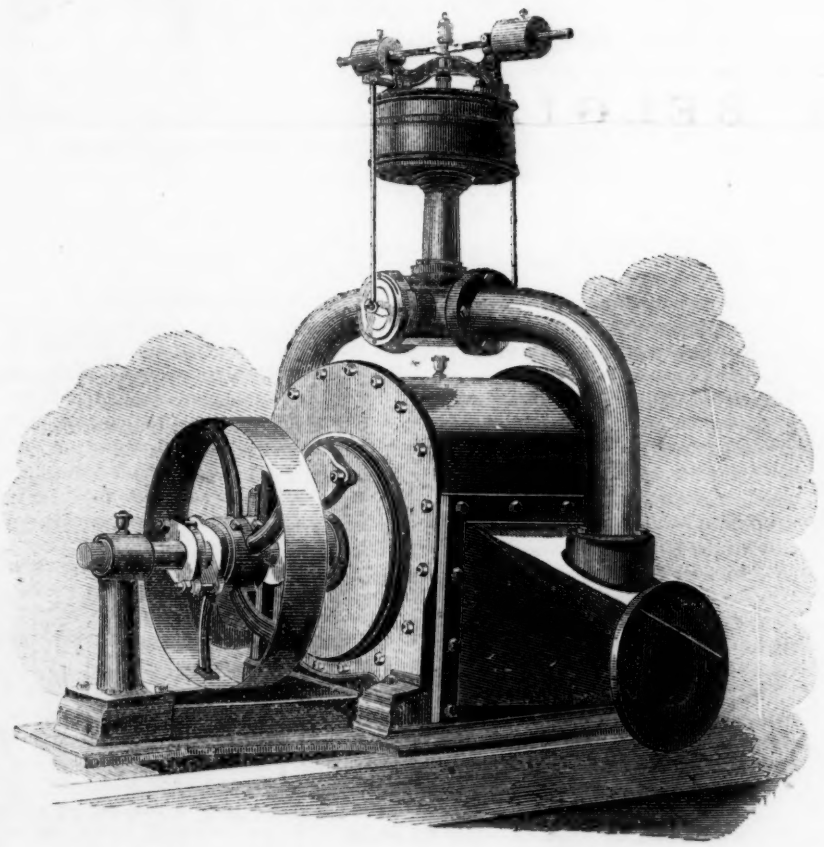

They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

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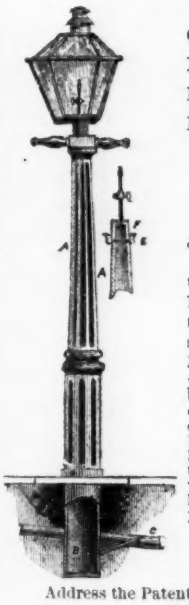

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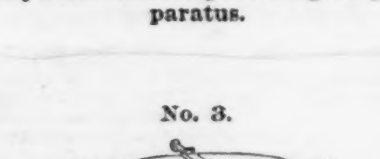

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They are constructed with water seal compartments to pass the gas through the required channels without leakage; with drip chambers to catch the water of condensation, tar, and ammoniacal liquor; and also with a loose or circular valve, to control the direction of the gas flow.

The By-Passes shown in the annexed illustrations, are similar in construction and varied in size to suit works of different capacity.

No. 1 is a By-Pass for Gas Works of small generating power, and using but a single apparatus; the gas from the retorts enters the proper nozzle, as shown by the arrow, and being deflected by the diaphragm of the valve over one of the vertical partitions of the drip chambers, it passes through one of the nozzles to the meter and returns to be again deflected by the rotary valve to the gas holder.

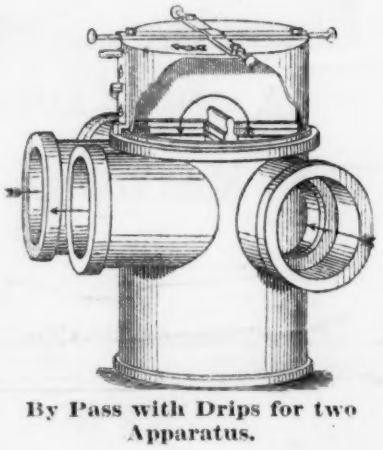
No. 2 is a By-Pass for using two apparatus, the gas is entered and the direction of its current is controlled similarly to that of No. 1, just described.

No. 3 is a By-Pass for passing the gas around the meter or not, according to the set of the loose or circular valve.

No. 4 is a sectional view of No. 3, and fully illustrates the construction and arrangement of the various By-Passes; the vertical partitions P are placed at right angles and divide the By-Pass into four drip chambers, they extend to within a short distance of the bottom to allow the water W, which forms the water seal, to circulate freely; the valve V is constructed with a diaphragm which divides it diametrically, the edges from ground joints with the upper edges of the partitions P, to prevent the gas from leaking from one chamber to another, and also to protect the ground surfaces from the corrosive action of the gas.

No. 5 is a single By-Pass with Drip Chambers.

No. 2.



By Pass with Drips for two Apparatus.

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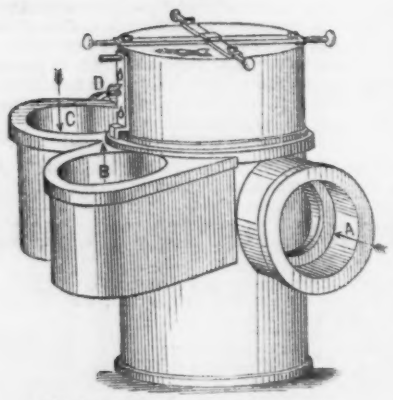
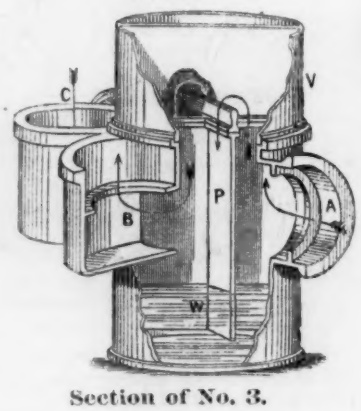


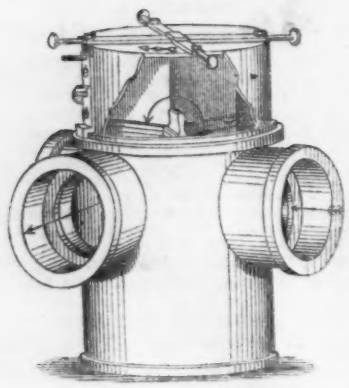
Meter By Pass with Drip.

No. 4.



Section of No. 3.

No. 5.



Single By Pass with Drip.